

Advanced Wastewater Photo-oxidation System, Phase I

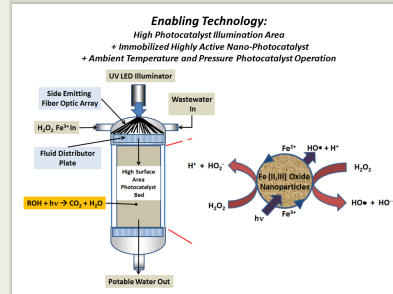
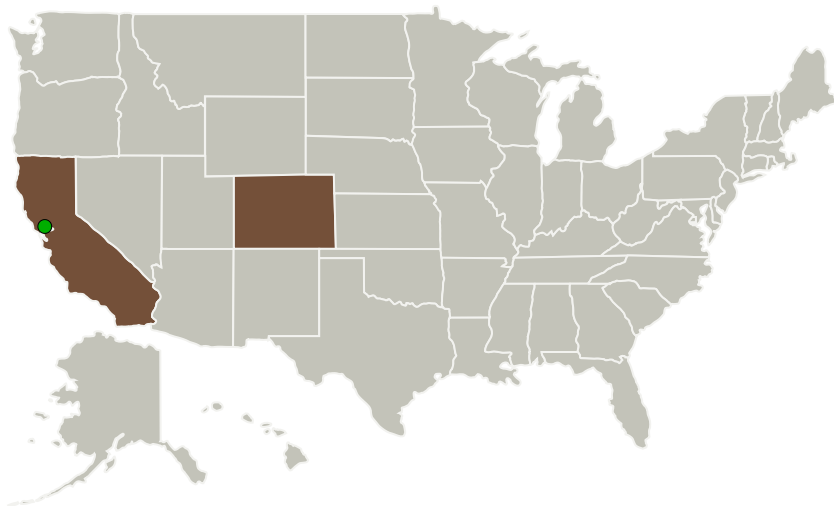
Completed Technology Project (2014 - 2014)



Project Introduction

Pioneer Astronautics proposes an advanced photocatalytic oxidation reactor for enhancing the reliability and performance of Water Recovery Post Processing systems aboard crewed spacecraft. This novel technology, called the Advanced Wastewater Photooxidation System (AWPS) is designed to oxidize and remove recalcitrant aqueous organic constituents in the water recovery post processing system under ambient temperature and pressure conditions. The basis of the innovation is the combination of high brightness and long lifetime UV LED light sources with efficient geometric illumination of a highly active photocatalyst immobilized on a high surface area support. This combined approach leads to numerous performance benefits including high conversion efficiency, low temperature and pressure operation, compact footprint, high reliability and low crew maintenance, and decreased equivalent system mass (ESM). The Phase I effort will clearly demonstrate the feasibility of these concepts by mineralization of polar water soluble organics and organosilanol constituents under long duration testing. Data from the Phase I will lead to a prototype scale-up of the device in Phase II. Development strategies for the Phase II device include component design verification testing and determining optimum reaction conditions. Long duration performance tests will validate the reactor design, and establish the technology applications in space and commercial markets.

Primary U.S. Work Locations and Key Partners



Advanced Wastewater Photo-oxidation System Project Image

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Organizations Performing Work	Role	Type	Location
Pioneer Astronautics	Lead Organization	Industry Historically Underutilized Business Zones (HUBZones)	Lakewood, Colorado
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California	Colorado
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Project Transitions

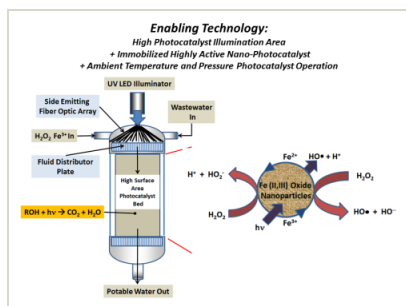
▶ **June 2014:** Project Start

✓ **December 2014:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137746>)

Images



Project Image

Advanced Wastewater Photo-oxidation System Project Image
(<https://techport.nasa.gov/image/137028>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Pioneer Astronautics

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

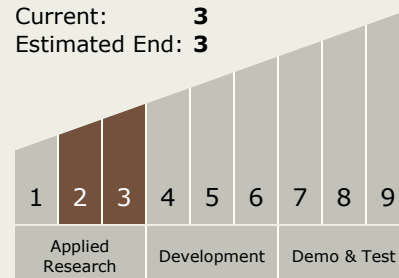
Carlos Torrez

Principal Investigator:

Thomas L Henshaw

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
 - └ TX06.1.2 Water Recovery and Management

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System